HP-UX Operating System: Peripherals Configuration

HP-UX version 11.00.01
Stratus Technologies
R1001H-05

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Preface

This manual describes how to configure peripherals for Continuum systems.

Revision Information

This manual has been revised to reflect support for Continuum systems using suitcases with the PA-8600 CPU modules, additional PCI card and storage device models, company and platform[1] name changes, and miscellaneous corrections to existing text.

Audience

This document is intended for system administrators who install and configure the HP-UX™ operating system.

Notation Conventions

This document uses the following conventions and symbols:

- The following font conventions apply both to general text and to text in displays:
  - `Monospace` represents text that would appear on your screen (such as commands and system responses, functions, code fragments, file names, directories, prompt signs, messages). For example,

    ```
    Broadcast Message from ...
    ```

1. Some Continuum systems were previously called Distributed Network Control Platform (DNCP) systems. References to DNCP still appear in some documentation and code.

- **`Monospace bold`** represents user input in screen displays. For example,

  `ls -a`

- *`Monospace italic`* represents variables in commands for which the user must supply an actual value. For example,

  `cp` *`filename1 filename2`*

  It also represents variables in prompts and error messages for which the system supplies actual values. For example,

  `cannot create temp filename` *`filename`*

- Helvetica represents all window titles, fields, menu names, and menu items in `swinstall` windows and System Administration Manager (SAM) windows. For example,

  Select Mark Install from the Actions menu.

- *Italic* emphasizes words in text. For example,

  …does *not* support…

  It is also used for book titles. For example,

  HP-UX Operating System: Peripherals Configuration (R1001H)

- **Bold** introduces or defines new terms. For example,

  An **object manager** is an OSNM process that …

- The notation Ctrl – char indicates a control–character sequence. To type a control character, hold down the control key (usually labeled Ctrl) while you type the character specified by char. For example, Ctrl – c means hold down the Ctrl key while pressing the c key; the letter c does not appear on the screen.

- Angle brackets (< >) enclose input that does not appear on the screen when you type it, such as passwords. For example,

  <*`password`*>

- Brackets ([ ]) enclose optional command arguments. For example,

  `cflow [-r] [-ix] [-i_] [-d` *`num`*`] `*`files`*

- The vertical bar (|) separates mutually exclusive arguments from which you choose one. For example,

  `command` `[`*`arg1 | arg2`*`]`

- Ellipses (…) indicate that you can enter more than one of an argument on a single command line. For example,

  `cb [-s] [-j] [-l` *`length`*`] [-V] [`*`file`* `…]`

- A right-arrow (>) on a sample screen indicates the cursor position. For example,

  ```
  >install - Installs Package
  ```

- A name followed by a section number in parentheses refers to a man page for a command, file, or type of software. The section classifications are as follows:
  - 1 – User Commands
  - 1M – Administrative Commands
  - 2 – System Calls
  - 3 – Library Functions
  - 4 – File Formats
  - 5 – Miscellaneous
  - 7 – Device Special Files
  - 8 – System Maintenance Commands

  For example, *init*(1M) refers to the man page for the `init` command used by system administrators.

- Document citations include the document name followed by the document part number in parentheses. For example, *HP-UX Operating System: Peripherals Configuration* (R1001H) is the standard reference for this document.

- Note, Caution, Warning, and Danger notices call attention to essential information.

NOTE

Notes call attention to essential information, such as tips or advice on using a program, device, or system.

CAUTION

Caution notices alert you to conditions that could damage a program, device, system, or data.

WARNING

Warning notices alert you to conditions that are potentially hazardous to people. These hazards can cause personal injury if the warnings are ignored.

DANGER

Danger notices alert you to conditions that are potentially lethal or extremely hazardous to people.

Product Documentation

The HP-UX operating system is shipped with the following documentation:

- *HP-UX Operating System: Peripherals Configuration* (R1001H) — provides information about configuring peripherals on a Continuum system
- *HP-UX Operating System: Installation and Update* (R1002H) — provides information about installing or upgrading the HP-UX operating system on a Continuum system
- *HP-UX Operating System: Read Me Before Installing* (R1003H) — provides updated preparation and reference information, and describes updated features and limitations
- *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) — provides information about administering a Continuum system running the HP-UX operating system
- *HP-UX Operating System: LAN Configuration Guide* (R1011H) — provides information about configuring a LAN network on a Continuum system running the HP-UX operating system
- *HP-UX Operating System: Site Call System User's Guide* (R1021H) — provides information about using the Site Call System utility
- *Managing Systems and Workgroups* (B2355-90157) — provides general information about administering a system running the HP-UX operating system (this is a companion manual to the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H))

Additional platform-specific documentation is shipped with complete systems (see "Related Documentation").

Online Documentation

When you install the HP-UX operating system software, the following online documentation is installed:

- notes files
- manual (man) pages

Notes Files

The `/usr/share/doc/RelNotes.fts` file contains the final information about this product.

The `/usr/share/doc/known_problems.fts` file documents the known problems and problem-avoidance strategies.

The `/usr/share/doc/fixed_list.fts` file lists the bugs that were fixed in this release.

Man Pages

The operating system comes with a complete set of online man pages. To display a man page on your screen, enter

`man` *`name`*

`name` is the name of the man page you want displayed. The `man` command includes various options, such as retrieving man pages from a specific section (for example, separate `term` man pages exist in Sections 4 and 5), displaying a version list for a particular command (for example, the `mount` command has a separate man page for each file type), and executing keyword searches of the one-line summaries. See the *man*(1) man page for more information.

Related Documentation

In addition to the operating system manuals, the following documentation contains information related to administering a Continuum system running the HP-UX operating system:

- The *Continuum Series 400-CO: Site Planning Guide* (R454), the *Continuum 400 Series: Site Planning Guide* (R411), or the *Continuum 600 and 1200 Series: Site Planning Guide* (R391) provides a system overview, site requirements (for example, electrical and environmental requirements), cabling and connection information, equipment specification sheets, and site layout models that can assist in your site preparation for the respective system.

- The *HP-UX Operating System: Continuum Series 400 Hardware Installation Guide* (R002H) or the *HP-UX Operating System: Continuum Series 400-CO Hardware Installation Guide* (R021H) describes how to install a complete Continuum Series 400 or 400-CO system from unpacking the system components to booting the machine.
- The *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) provides detailed descriptions and diagrams, along with instructions about installing and maintaining the system components for the respective system.
- The *D859 CD-ROM Drive Installation and Operation Guide* (R720) or the *Continuum Series 600 and 1200: D758 CD-ROM Drive Guide* (R447) describes how to install, operate, and maintain CD-ROM drives for the respective system.
- The *Continuum Series 400-CO: Tape Drive Operation Guide* (R719), the *Continuum Series 400 and 400-CO: Tape Drive Operation Guide* (R716), or the *Continuum 600 and 1200 Series: Tape-Drive Operation Guide* (R442) describes how to operate and maintain tape drives for the respective system.
- The *Continuum 600 and 1200 Series: PMC-Card Installation Guide* (R443) describes how to install PMC cards into Continuum Series 600 and 1200 systems.
- Each PCI card installation guide describes how to install that PCI card into a Continuum system.
- The *sam*(1M) man page provides information about using the System Administration Manager (SAM).
- For information about manuals available from Hewlett-Packard™, see the Hewlett-Packard documentation web site at `http://www.docs.hp.com`.

Ordering Documentation

HP-UX operating system documentation is provided on CD-ROM (except for the *Managing Systems and Workgroups* (B2355-90157) which is available as a separate printed manual). You can order a documentation CD-ROM or other printed documentation in either of the following ways:

- Call the CAC (see "Customer Assistance Center (CAC)").
- If your system is connected to the Remote Service Network (RSN), add a call using the Site Call System (SCS). See the *scsac*(1) man page for more information.

When ordering a documentation CD-ROM please specify the product and platform documentation you desire, as there are several documentation CD-ROMs available. When ordering a printed manual, please provide the title, the part number, and a purchase order number from your organization. If you have questions about the ordering process, contact the CAC.

Commenting on This Guide

Stratus welcomes any corrections or suggestions for improving this guide. Contact the CAC to provide input about this guide.

Customer Assistance Center (CAC)

The Stratus Customer Assistance Center (CAC), is available 24 hours a day, 7 days a week. To contact the CAC, do one of the following:

- Within North America, call 800-828-8513.
- For local contact information in other regions of the world, see the CAC web site at http://www.stratus.com/support/cac and select the link for the appropriate region.

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Getting Started

When you physically install a disk drive, tape drive, expansion cabinet, or other peripheral device, you sometimes must configure the HP-UX operating system to communicate with it. Many portions of a Continuum system are preconfigured and do not require additional administrator actions, but some peripherals require configuration in order for Continuum systems to recognize them. For many peripherals, Stratus provides a simple value-added process that allows you to add (or remove) peripherals dynamically without the need for an HP-UX operating system reboot.

This manual provides the software information needed by system administrators to configure peripheral devices supported on Continuum systems running the HP-UX operating system.

Read this chapter for:

- an overview of peripherals configuration
- syntax of device special file names
- information on using `ftsmaint` and `ioscan` commands to display information and administer hardware

NOTE

Most administrative commands and utilities reside in standard locations. In this guide, only the command name, not the full path name, is provided if that command resides in a standard location. The standard locations are `/usr/sbin`, `/bin`, `/usr/bin`, and `/etc`. Full path names are provided when the command is located in a nonstandard directory. You can determine file locations through the `find` and `which` commands. See the *find*(1) and *which*(1) man pages for more information.

Keep this manual, the online man pages, and any other manuals that were shipped with your Continuum system available for reference when installing and configuring peripheral devices.

Commands such as `mksf`, `insf`, and `ioscan`, as well as the Stratus value-added `ftsmaint` command, make it unnecessary to manipulate the device special minor number literally. The Stratus-developed utilities for the HP-UX operating system provide the `ftsmaint` command, which provides similar functionality to the `ioscan` command, but with added capabilities for administration of Stratus fault tolerant hardware.

NOTE

Configuring a peripheral device requires that you operate with `root` privileges. Exercise caution when acting as super-user.

Peripherals and Fault Tolerant Hardware

Continuum systems employ fault tolerant hardware and hot-plugging features that simplify your tasks in configuring Continuum systems for peripheral support. See the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about fault tolerant features. See the hardware documentation for information about installing and maintaining Continuum system components.

Continuum system components are identified by hardware paths. Hardware paths specify the addresses of the hardware components leading to specific devices. Hardware paths consist of a numerical string of hardware addresses, notated sequentially from the bus address to the device address. Typically, the initial number is appended by a slash (/) to represent a bus converter or adapter and subsequent numbers are separated by a dot (.). In order to understand how to configure Continuum systems for peripherals, you need to know how hardware paths map to the physical and logical hardware components. See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about how to determine hardware paths.

Differences from Hewlett-Packard Systems

Stratus and Hewlett-Packard systems do not support the same set of peripheral devices.

Continuum systems *do not* support the following types of peripherals and supporting hardware:

- floppy disk drives
- disk arrays
- magneto-optical devices
- printers and plotters (except through the optional asynchronous interface)
- graphics cards
- ISA cards

Continuum systems *do* support:

- A CD-ROM drive on the external SCSI bus. You cannot configure in a CD-ROM drive in place of one of the base unit disk drives.
- Adding most peripherals without shutting down and rebooting the system. If you are familiar with using the HP-UX operating system on a non-fault-tolerant system, you should make a special effort to familiarize yourself with these differences.

Continuum systems *differ* in the way they support:

- Uninterruptible Power Supply (UPS)
- Modems. See Chapter 3, “Configuring Serial Ports for Terminals and Modems,” for more information.

Peripheral Configuration in Its Simplest Terms

A peripheral device requires two or three configuration steps to communicate with the HP-UX operating system: configure, install, and (if needed) reboot. Most devices supported by Continuum systems do not need a system reboot to be recognized by the system. Standard device drivers are already present in the kernel.

1. **Configure the device drivers into the kernel.**

   Device drivers are like translators that speak both the language of the peripheral device and the language of the computer. The needed device drivers for Stratus-qualified peripherals are already part of the kernel. In some cases, you will have to run the `addhardware` command to associate the device with its driver.

2. **Install the hardware.**

   Perform any hardware-specific installation procedures required to physically connect the peripheral device to your computer. Then, turn on the power to the peripheral devices. For most peripherals associated with Continuum systems, the HP-UX operating system will bring the device online through a process known as hot-plugging, meaning that it is not necessary to turn off the power to the system.

3. **Reboot the system.**

   The HP-UX operating system automatically creates the necessary device special files required for the peripheral, either through Stratus-specific commands or upon system reboot. (For most peripherals associated with Continuum systems, special commands must be entered, but rebooting is not necessary.) Peripherals such as disk expansion cabinets require a reboot for the HP-UX operating system to recognize them and cannot be added dynamically to a running Continuum system. At least one device special file must exist for the device driver to communicate with the peripheral device. Device special files tell the HP-UX operating system which device driver to use, how to find the peripheral device, and what special characteristics the peripheral device employs.

Using SAM to Configure Peripherals

The System Administration Manager (SAM) provides the easiest way to view your Continuum system configuration and configure the peripheral device drivers into the kernel. To invoke SAM, enter

```
sam
```

SAM's user interface and online help system allow you to discover the configuration information as you proceed through its screens. Once you provide SAM with basic information about the device being configured, SAM performs the following steps:

1. Checks your currently running kernel configuration file for the required device drivers
2. Reports whether or not the drivers are present
3. Adds them (if necessary)
4. Reconfigures the kernel (if necessary)

For some devices, SAM also automates other necessary steps. For example, when adding a terminal to your Continuum system, SAM edits the `/etc/inittab` file to add the terminal entry. You have to perform this step manually if you are not using SAM to configure the terminal.

Using Commands to Configure Peripherals

You must use HP-UX operating system commands to configure peripherals to the system if the device cannot be automatically configured or if SAM is not on your system.

Most Stratus peripherals are configured automatically. Each peripheral-specific chapter of this book gives procedures for using HP-UX operating system commands and Stratus-specific commands for configuration. Most Stratus peripherals can be configured into a running Continuum system without rebooting.

Third-party drivers and certain drivers used for instrumentation or "black-box" applications are not recognized by `insf` to create device files automatically during the reboot process.

If you are adding a peripheral device requiring a driver that cannot be configured automatically, you must configure the device driver and create the device files using the `ioscan` and `mksf` or `mknod` commands.

Read the `/usr/conf/master.d/core-hpux` file and the *master*(4) man page for information about the architectural-context dependencies.

Understanding Device Special File Names

Device special files tell the HP-UX operating system which device driver to use, how to find the peripheral device, and what characteristics the peripheral device should employ. Characteristics vary by device. For example, device special files for tape drives show rewind and density.

Most device special file names contain the location of the device on the bus architecture. To see this, display the files in any subdirectory of the `/dev` directory. Note, all mass storage devices adhere to a syntax that includes `c#t#d#[s#]` (other kinds of device files use a related convention).

The `c#t#d#[s#]` syntax used in default device special files has the following meaning:

`c#`	card instance for the `ext_bus` class of interface card to which the device is attached
`t#`	target (SCSI address) of the disk device on the interface
`d#`	device unit number
`s#`	section number (provided for backward compatibility); the device file addresses the entire disk (`s0`) when `s#` is unspecified

Sample Device Special File Names

Every peripheral-specific chapter in this book lists the default device special file names for that class of device. See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about determining peripheral hardware addresses.

Here are some sample device special files and their possible meanings:

`/dev/rdsk/c0t2d0`	Entire disk accessed in character (raw) mode through SCSI card instance 0, target 2, LUN 0.
`/dev/rmt/c1t0d0BESTnb`	Tape drive accessed through card instance 1, target 0, LUN 0. Tape writes at best available density/format, no rewind, Berkeley-style close.
`/dev/rmt/0mnb`	Tape drive device special file with identical characteristics (linked) to `/dev/rmt/c1t0d0BESTnb`.

Both `lssf` and `ioscan` commands display the interface to which a device is connected. These are discussed in the following sections.

Viewing System Configuration with ioscan

The `ioscan` command is the most versatile standard tool in the HP-UX operating system for displaying your system configuration. For example, you can use `ioscan` to identify available hardware addresses.

On Continuum systems, you can also use `ftsmaint` to identify available hardware addresses, as well as for other administration tasks. See "Using ftsmaint to Administer System Hardware" later in this chapter and the *ftsmaint*(1M) man page for a description of `ftsmaint` features.

Terse Listing of ioscan

In its simplest form, `ioscan` displays hardware path, device class, and description. The `-u` (usable devices) or `-k` (kernel structures) options give the fastest response because they do not probe the hardware. See Figure 1-1 for a sample of the output on a Continuum system.

```
# ioscan -u
H/W Path    Class                  Description
=================================================
0/0/0              phys_cpus       CPU Adapter
0/0/1              phmem           MEM Adapter
0/1/0              phys_cpus       CPU Adapter
0/1/1              phmem           MEM Adapter
0/2/0/0               pcmcia       PCMCIA Bridge
0/2/0/0.0                flash     FLASH Adapter
0/2/1/0               pseudo       LAN Adapter
0/2/2/0               tty          Asyn Card
0/3/0/0               pcmcia       PCMCIA Bridge
0/3/0/0.0                flash     FLASH Adapter
0/3/3/0               tty          Asyn Card
1/0             phys_recc          RECC Adapter
1/1             phys_recc          RECC Adapter
13/0/0             lan             Lan Adapter
14/0/0.0.0              disk       SEAGATE ST15150W
14/0/0.3.0              disk       SEAGATE ST32550W
14/0/1.1.0              disk       SEAGATE ST15150W
14/0/1.2.0              disk       SEAGATE ST32550W
14/0/3.4.0              tape       HP      C1557A
15/2/0             tty             console
15/2/1             tty             tty1
15/2/2             tty             tty2
```

Figure 1-1. Sample Listing of ioscan

Understanding Hardware Addresses

Each piece of hardware configured to a computer is identified to the HP-UX operating system through the *hardware address* (shown in `ioscan` as `H/W Path`). The length of these numerical sequences differs by Continuum system model and architecture, but every hardware path leads you through the bus structure, starting from the bus closest to the Continuum system processor and ending at the output device.

The `ioscan -H` *`hardware_path`* command shows you the sequence of connection to or from the specified location. For example, in Figure 1-2, the initiator on the SCSI adapter on a Continuum system has the address of `0/4/0/1`.

```
# ioscan -H 0/4/0/1
H/W Path Class             Description
=======================================
0/4/0/1             ext_bus HSC SCSI Adapter
```

Figure 1-2. Sample ioscan -H Output

The hardware path can be decoded as follows:

`0`	identifies the system bus
`4`	identifies the location of the bus adapter connecting the device (in this example, the HSC Nexus or high-speed communications bus) to the system bus
`0`	identifies a transparent layer between the Nexus bus and the SCSI interface
`1`	identifies the slot number of the SCSI interface

Field separators (slash (`/`) or dot (`.`)) separate the numbers of the hardware address and have no bearing on system administration. The displayed classes are more meaningful in the context of instance numbers. Instance numbers are visible in `ioscan -f` listings, and are discussed later in this chapter.

Understanding the Description in ioscan

The description field displayed by `ioscan` derives from the peripheral device itself, and is sometimes more cryptic than is ideal. Typically, a numeric description refers to the manufacturer's vendor ID, and in some cases, this number corresponds to more than one model number. If you are troubleshooting a peripherals problem, the description is often useful information to a Stratus support engineer.

Full Listing of ioscan

The `ioscan -f` command displays full information about the Continuum system configuration, including instance number, device/interface driver, software state, and hardware type. The `-fn` option displays the device special files also. Figure 1-3 shows sample `ioscan -f` output.

```
# ioscan -f
Class       I   H/W Path     Driver      S/W State H/W Type    Description
============================================================================
bc          0               root        CLAIMED   BUS_NEXUS
ba          0   0            gbuscdio    CLAIMED   BUS_NEXUS   GOLFBUS Nexus
ba          1   0/0          pmerc       CLAIMED   BUS_NEXUS   PMERC Nexus
phys_cpus   0   0/0/0        merc_cpus   CLAIMED   INTERFACE   CPU Adapter
phmem       0   0/0/1        phmem       CLAIMED   INTERFACE   MEM Adapter
ba          2   0/1          pmerc       CLAIMED   BUS_NEXUS   PMERC Nexus
phys_cpus   1   0/1/0        merc_cpus   CLAIMED   INTERFACE   CPU Adapter
phmem       1   0/1/1        phmem       CLAIMED   INTERFACE   MEM Adapter
ba          3   0/4          bio         CLAIMED   BUS_NEXUS   HSC Nexus
ext_bus     16  0/4/0/1      bsha        CLAIMED   INTERFACE   HSC SCSI Adapter
ext_bus     17  0/4/0/2      bsha        CLAIMED   INTERFACE   HSC SCSI Adapter
pseudo      0   0/4/0/5      hsc         CLAIMED   INTERFACE   HSC LAN Adapter
ba          13  0/6          pci         CLAIMED   BUS_NEXUS   PCI Nexus
ba          14  0/6/1        slot        CLAIMED   BUS_NEXUS   SLOT Interface
pseudo      6   0/6/1/0      hdi         CLAIMED   INTERFACE   FDDI Adapter
ba          15  0/6/2        slot        CLAIMED   BUS_NEXUS   SLOT Interface
pseudo      2   0/6/2/0      hdi         CLAIMED   INTERFACE   LAN Adapter
ba          25  1            reccbus     CLAIMED   BUS_NEXUS   RECCBUS Nexus
phys_recc   0   1/0          recc        CLAIMED   INTERFACE   RECC Adapter
phys_recc   1   1/1          recc        CLAIMED   INTERFACE   RECC Adapter
ba          26  11           lpkiocdio   CLAIMED   BUS_NEXUS
ba          27  12           cabcdio     CLAIMED   BUS_NEXUS   CAB Nexus
ba          31  12/0         cabcdio     CLAIMED   BUS_NEXUS   Cabinet 0
cabinet     0   12/0/0       cab         CLAIMED   INTERFACE   Cabinet DataCollector0
cabinet     1   12/0/1       cab         CLAIMED   INTERFACE   Cabinet Fan0
ba          28  13           lnmcdio     CLAIMED   BUS_NEXUS   LNM Nexus
lan         0   13/0/0       lan2        CLAIMED   INTERFACE   Lan Adapter
lan         1   13/0/1       lan2        CLAIMED   INTERFACE   Lan Adapter
ba          29  14           lsmcdio     CLAIMED   BUS_NEXUS   LSM Nexus
ext_bus     0   14/0/0       lsm         CLAIMED   INTERFACE   LSM Adapter
target      0   14/0/0.0     tgt         CLAIMED   DEVICE
disk        0   14/0/0.0.0   sdisk       CLAIMED   DEVICE      SEAGATE ST19171W
target      1   14/0/0.1     tgt         CLAIMED   DEVICE
disk        1   14/0/0.1.0   sdisk       CLAIMED   DEVICE      SEAGATE ST19171W
ext_bus     2   14/0/2       lsm         CLAIMED   INTERFACE   LSM Adapter
ext_bus     3   14/0/3       lsm         CLAIMED   INTERFACE   LSM Adapter
ba          30  15           mercury     CLAIMED   BUS_NEXUS   LMERC Nexus
processor   0   15/0/0       processor   CLAIMED   PROCESSOR   Processor
processor   1   15/0/1       processor   CLAIMED   PROCESSOR   Processor
```

Figure 1-3. Sample ioscan -f Output

Understanding Class and Instance

The sample `ioscan` output in Figure 1-4 shows the `ext_bus` class of a sample Continuum system. The card instance numbers are listed under `I`.

For device file naming and hardware mapping, the only significant instance numbers are those associated with the `INTERFACE` hardware type.

```
# ioscan -C ext_bus -f
Class     I  H/W Path  Driver   S/W State   H/W Type     Description
============================================================================
ext_bus  16  0/4/0/1   bsha     CLAIMED     INTERFACE    HSC SCSI Adapter
ext_bus  17  0/4/0/2   bsha     CLAIMED     INTERFACE    HSC SCSI Adapter
ext_bus  18  0/4/0/3   bsha     CLAIMED     INTERFACE    HSC SCSI Adapter
ext_bus  19  0/4/0/4   bsha     CLAIMED     INTERFACE    HSC SCSI Adapter
ext_bus   0  14/0/0    lsm      CLAIMED     INTERFACE    LSM Adapter
ext_bus   1  14/0/1    lsm      CLAIMED     INTERFACE    LSM Adapter
ext_bus   2  14/0/2    lsm      CLAIMED     INTERFACE    LSM Adapter
ext_bus   3  14/0/3    lsm      CLAIMED     INTERFACE    LSM Adapter
```

Figure 1-4. Class and Instance in ioscan Display

The card instance number is assigned by the HP-UX operating system to the interface card and reflects the order that `ioconfig` binds that class of interface card to its driver when it boots.

Instance is stored in two files: `/etc/ioconfig` and `/stand/ioconfig`. These files retain their information across reboots, unless one is corrupted or missing, in which case `ioinit` will rebuild the entire `/dev` structure. (If this occurs, you would have to re-create any customized permissions or files.)

If you use the `addhardware` command to add a new hardware device, the `ioconfig` files are automatically updated by the command.

Card Instances and Device Files

Card instance number and hardware path elements map directly into the device special file as card instance, target number, and device number. For example, the disk device special file `/dev/dsk/c1t3d0` refers to instance one of the logical SCSI manger (`lsm`), target disk with SCSI ID 3, and logical unit number (`lun`) of 0. Typically, the card instance maps as the digit after the letter `c` (or for terminals, the number after `tty`).

Note, the card instance designated in the device special file refers to the interface card, *not* to the instance number of the peripheral device attached to the card. The card instance number is unique *only* for the specific class (for example, `ext_bus`) of interface. Thus, for example, the `tty` class of interface has its own sequence of card instance numbers, beginning with zero, which appear in its device files.

Decoding Device Special Files with lssf

Use the `lssf` command to decode device special files, as in the following Continuum Series 400 example:

```
# lssf /dev/lan
streams cloneable pseudo driver dlpi /dev/lan
```

Finding Device Special Files

You can use `ioscan -fn` (or `-fkn` or `-fun`) to show device special file names associated with a peripheral. You can also add other `ioscan` options (such as `-H`, `-C`, `-d`, or `-I`) to limit your output to specific elements in your configuration.

The example in Figure 1-5, using `-C` disk, shows the device files available for the disk class, as well as the location and type of disk device.

```
# ioscan -C disk -fun
Class     I  H/W Path    Driver  S/W State   H/W Type     Description
===================================================================
disk      0  14/0/0.1.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c0t1d0   /dev/rdsk/c0t1d0
disk      1  14/0/0.2.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c0t2d0   /dev/rdsk/c0t2d0
disk      2  14/0/0.3.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c0t3d0   /dev/rdsk/c0t3d0
disk      3  14/0/0.4.0  sdisk   CLAIMED     DEVICE       SEAGATE ST34573WC
                         /dev/dsk/c0t4d0   /dev/rdsk/c0t4d0
disk      4  14/0/0.5.0  sdisk   CLAIMED     DEVICE       TOSHIBA CD-ROM XM-3801TA
                         /dev/dsk/c0t5d0   /dev/rdsk/c0t5d0
disk      5  14/0/1.0.0  sdisk   CLAIMED     DEVICE       SEAGATE ST34371W
                         /dev/dsk/c1t0d0   /dev/rdsk/c1t0d0
disk      6  14/0/1.1.0  sdisk   CLAIMED     DEVICE       SEAGATE ST39173WC
                         /dev/dsk/c1t1d0   /dev/rdsk/c1t1d0
disk      7  14/0/1.2.0  sdisk   CLAIMED     DEVICE       SEAGATE ST39173WC
                         /dev/dsk/c1t2d0   /dev/rdsk/c1t2d0
disk      8  14/0/1.3.0  sdisk   CLAIMED     DEVICE       SEAGATE ST39173WC
                         /dev/dsk/c1t3d0   /dev/rdsk/c1t3d0
disk      9  14/0/1.4.0  sdisk   CLAIMED     DEVICE       SEAGATE ST118273WC
                         /dev/dsk/c1t4d0   /dev/rdsk/c1t4d0
disk     10  14/0/1.5.0  sdisk   CLAIMED     DEVICE       SEAGATE ST118273WC
                         /dev/dsk/c1t5d0   /dev/rdsk/c1t5d0
disk     11  14/0/2.0.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c2t0d0   /dev/rdsk/c2t0d0
disk     12  14/0/2.1.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c2t1d0   /dev/rdsk/c2t1d0
disk     13  14/0/2.2.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c2t2d0   /dev/rdsk/c2t2d0
disk     14  14/0/2.3.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c2t3d0   /dev/rdsk/c2t3d0
disk     15  14/0/2.4.0  sdisk   CLAIMED     DEVICE       SEAGATE ST19171W
                         /dev/dsk/c2t4d0   /dev/rdsk/c2t4d0
```

Figure 1-5. Device Special Files Associated with a Peripheral

See the *ioscan*(1M) man page for further information about this tool.

Using ftsmaint to Administer System Hardware

The `ftsmaint` command is the primary utility for managing Continuum system hardware components. The `ftsmaint` command provides a variety of services such as the following:

- displays hardware configuration and status information (similar to `ioscan`)
- enables or disables hardware devices
- synchronizes paired components (for example, duplexing/unduplexing CPU/memory boards or switching online/standby console controllers)
- burns board-resident PROM code
- configures mean-time-between-failure (MTBF) settings

To view a list of command options, enter

```
ftsmaint -h
```

See the *ftsmaint*(1M) man page for a description of all options. See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for examples of using `ftsmaint` to accomplish various administrative tasks.

NOTE

Use the `addhardware` command to add new peripheral components to your Continuum system; use `ftsmaint` to remove or replace peripheral components.

Displaying Hardware Information

The `ls` option displays information about the Continuum system configuration, including instance number, device/interface driver, software state, and hardware type. To view configuration and status information, enter one of the following:

`ftsmaint ls`	[short listing of all components]
`ftsmaint ls -l`	[long listing of all components]
`ftsmaint ls` *`hw_path`*	[long listing for *`hw_path`*]

`hw_path` is the hardware path for a specific component. The fields in a long listing vary according to the type of component. Figure 1-6 shows a sample short listing of all components.

```
# ftsmaint ls
Modelx H/W Path      Description          State Serial#   PRev Status  FCode Fct
================================================================================
-                                         CLAIM -         -    Online  -       0
-      0             GOLFBUS Nexus        CLAIM -         -    Online  -       0
g31100 0/0           PMERC Nexus          CLAIM 10432     9.0  Online  -       0
-      0/0/0         CPU Adapter          CLAIM -         -    Online  -       0
m70700 0/0/1         MEM Adapter          CLAIM -         -    Online  -       0
g31100 0/1           PMERC Nexus          CLAIM 10414     9.0  Online  -       0
-      0/1/0         CPU Adapter          CLAIM -         -    Online  -       0
m70700 0/1/1         MEM Adapter          CLAIM -         -    Online  -       0
k46000 0/4           HSC Nexus            CLAIM 3718      18.2 Online  -       0
-      0/4/0/1       HSC SCSI Adapter W/S CLAIM -         -    Online  -       0
-      0/4/0/2       HSC SCSI Adapter W/S CLAIM -         -    Online  -       0
-      0/4/0/3       HSC SCSI Adapter SE  CLAIM -         -    Online  -       0
-      0/4/0/4       HSC SCSI Adapter SE  CLAIM -         -    Online  -       0
-      0/4/0/5       HSCENET Adapter      CLAIM -         -    Online  -       0
-      0/4/0/6       Hawaii Cabinet       CLAIM -         -    Online  -       0
e57500 0/4/0/6/0     Oahu Module          CLAIM -         -    Online  -       0
-      0/4/0/7       Hawaii Cabinet       CLAIM -         -    Online  -       0
e57500 0/4/0/7/0     Oahu Module          CLAIM -         -    Online  -       0
-      0/4/0/8       Hawaii Cabinet       CLAIM -         -    Online  -       0
-      0/4/0/9       Hawaii Cabinet       CLAIM -         -    Online  -       0
-      1             RECCBUS Nexus        CLAIM -         -    Online  -       0
e59300 1/0           RECC Adapter         CLAIM 10432     18.0 Online  -       0
e59300 1/1           RECC Adapter         CLAIM 10414     18.0 Online  -       0
-      11                                  CLAIM -         -    Online  -       0
-      11/10         LPKIO NEXUS          CLAIM -         -    Online  -       0
k11800 11/10/9       k118 adapter         CLAIM 10934     -    Online  -       0
k11200 11/10/10      RSE 2-port K112: tem CLAIM -         -    Online  -       0
k11200 11/10/11      RSE 2-port K112: tem CLAIM -         -    Online  -       0
k11800 11/10/12      k118 adapter         CLAIM 11326     -    Online  -       0
k11800 11/10/13      k118 adapter         CLAIM 10833     -    Online  -       0
-      11/10/14      PK Terminator        CLAIM -         -    Online  -       0
-      11/10/15      PK Terminator        CLAIM -         -    Online  -       0
-      12            CAB Nexus            CLAIM -         -    Online  -       0
-      12/0          Central Equip Cabine CLAIM -         -    Online  -       0
e59000 12/0/0        Cabinet Data Collect CLAIM 12667     -    Online  -       0
e68400 12/0/1        Cabinet Fan 0        CLAIM -         -    Online  -       0
e68400 12/0/2        Cabinet Fan 1        CLAIM -         -    Online  -       0
ax6100 12/0/7        Cabinet Air Filter 0 CLAIM -         -    Online  -       0
```

```
p21400 12/0/8        AC Power Controller  CLAIM -         -    Online  -       0
p21400 12/0/10       AC Power Controller  CLAIM -         -    Online  -       0
p20600 12/0/12       Power Supply Unit 0  CLAIM -         -    Online  -       0
p20600 12/0/13       Power Supply Unit 1  CLAIM -         -    Online  -       0
-      13            LNM Nexus            CLAIM -         -    Online  -       0
-      13/0/0        LAN Adapter          CLAIM -         0    Online  -       0
-      13/0/1        LAN Adapter          CLAIM -         0    Online  -       0
-      14            LSM Nexus            CLAIM -         -    Online  -       0
-      14/0/0        LSM Adapter          CLAIM -         -    Online  -       0
-      14/0/0.0                           CLAIM -         -    Online  -       0
d70600 14/0/0.0.0    SEAGATE ST19171W     CLAIM -         -    Online  -       0
-      14/0/0.1                           CLAIM -         -    Online  -       0
d70520 14/0/0.1.0    SEAGATE ST34371W     CLAIM -         -    Online  -       0
-      14/0/1        LSM Adapter          CLAIM -         -    Online  -       0
-      14/0/1.0                           CLAIM -         -    Online  -       0
d70600 14/0/1.0.0    SEAGATE ST19171W     CLAIM -         -    Online  -       0
-      14/0/1.1                           CLAIM -         -    Online  -       0
d70520 14/0/1.1.0    SEAGATE ST34371W     CLAIM -         -    Online  -       0
-      14/0/1.4                           CLAIM -         -    Online  -       0
-      14/0/1.4.0    SEAGATE ST32171W     CLAIM -         -    Online  -       0
-      14/0/2        LSM Adapter          CLAIM -         -    Online  -       0
-      14/0/3        LSM Adapter          CLAIM -         -    Online  -       0
-      15            LMERC Nexus          CLAIM -         -    Online  -       0
-      15/0/0        Processor            CLAIM -         -    Online  -       0
-      15/1/0        Memory               CLAIM -         -    Online  -       0
-      15/2/0        console              CLAIM -         -    Online  -       0
```

Figure 1-6. ftsmaint Output

Figure 1-7 and Figure 1-8 are sample long listings for two components, a console controller and a SCSI adapter card.

NOTE

The reported fields differ somewhat for these components.

```
# ftsmaint ls 1/0
H/W Path            : 1/0
Device Name         : reccs
Description         : RECC Adapter
Class               : phys_reccs
Instance            : 0
State               : CLAIMED
Status              : Online
Modelx              : e593
Sub Modelx          : 00
Board Type          : 0
Board Rev           : 59
Art Rev             : 0
Min Partner Revision: 0
Firmware Rev        : 18.0
Serial#             : 10432
Fault Count         : 0
Fault Code          : -
MTBF                : Infinity
MTBF Threshold      : 600 Seconds
Weight. Soft Errors : 1
Min. Number Samples : 6
```

Figure 1-7. ftsmaint Output for 1/0

```
# ftsmaint ls 0/2/7/2
H/W Path            : 0/2/7/2
Partner H/W Path    : 0/3/7/2
Device Name         : dpt
Description         : SCSI Adapter W/SE
Class               : ext_bus
Instance            : 18
State               : CLAIMED
Status              : Online Duplexed
Modelx              : u501
Sub Modelx          : 00
Firmware Rev        : 0ST5
Serial#             : 42-000643
PCI Vendor ID       : 0x1044
PCI Device ID       : 0xA400
Fault Count         : 0
Fault Code          : -
MTBF                : Infinity
MTBF Threshold      : 600 Seconds
Weight. Soft Errors : 1
Min. Number Samples : 6
```

Figure 1-8. ftsmaint Output for 0/2/7/2

2

Configuring Interface Cards

This chapter discusses removing and replacing components, and downloading firmware. It ends with a summary on configuring a peripheral.

Removing and Replacing Components

The HP-UX operating system adds components to the system structure at boot time by inventorying the existing Continuum hardware components and configuring the system accordingly. Once the system is running, you can use the `ftsmaint` command to remove and replace Continuum hardware components or the `addhardware` command to add new hardware to a running system.

When replacing Customer Replacable Units (CRUs), the following restrictions apply:

- When removing a hardware component, you must replace it with another component of the same type.
- The `addhardware` command allows you to add a new hardware component to a running system without needing to manually step through remaking the kernel or rebooting the system. See the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) and the *mk_kernel*(1M), *flifcp*(1M), and *flashdd*(1M) man pages.
- To prevent unpredictable system behavior, issue an `ftsmaint disable` and following `enable` command to disconnect it from its software link before removing a hardware component.

A newly replaced CRU undergoes diagnostic self-test. If it passes diagnostics and satisfies configuration constraints, the resources contained in that component are made available to the system.

Downloading Firmware

On Continuum systems a user-level daemon is responsible for downloading firmware. This daemon is `downloadd`. See the *downloadd*(1M) man page for additional information. This daemon is used to download firmware for the Async, SDLC, and X.25 protocols.

Each time the system boots, `downdloadd` is started and performs its designated actions, including:

- renaming the logfile `/var/adm/download.log` to `/var/adm/download.log.OLD`
- registering the protocol with FTS
- receiving notification from FTS and performing the protocol-specific action whenever a `downloadd`-defined card is removed, inserted, disabled, or removed

To perform these actions, `downloadd` downloads firmware by executing commands in the `/etc/stratus/download.conf` configuration file. Figure 2-1 shows a sample `download.conf` file.

```
/etc/stratus/download.conf
---------------------------
# This is a configuration file for Continuum Series 400 hardware
# Key hw_path fw_path Modelx personality event command

# Async Card
F * -  u45000    -    INI "/usr/sbin/asyndload -i $INST"
C - -  -         -    ENA "/usr/sbin/asyndload -i $INST"
C - -  -         -    ACT "/usr/sbin/asyndload -i $INST"

F * - k11800     -    INI  "/usr/sbin/kdload -d /dev/diag/mux$INST -f \
  /etc/stratus/prom_code/ioa18_async.pm"
C - - -          -    ENA  "/usr/sbin/kdload -d /dev/diag/mux$INST -f \
  /etc/stratus/prom_code/ioa18_async.pm"
C -  -  -           -    ACT    "/usr/sbin/kdload -d /dev/diag/mux$INST -f \
  /etc/stratus/prom_code/ioa18_async.pm"

# ARTIC RSE
F * *  u40300   RSE INI "/usr/sbin/articdload -p $HW_PATH -d /dev/psdbg -c $FW_PATH"
C - -  -         -   ENA "/usr/sbin/articdload -p $HW_PATH -d /dev/psdbg -c $FW_PATH"
C - -  -         -   ACT "/usr/sbin/articdload -p $HW_PATH -d /dev/psdbg -c $FW_PATH"
# ARTIC RSE
F * *  u40400   RSE INI "/usr/sbin/articdload -p $HW_PATH -d /dev/psdbg -c $FW_PATH"
```

Figure 2-1. Sample download.conf File

The fields in the `/etc/stratus/download.conf` file have the following meanings:

`Key` Indicates the status of the entry.

- `F` specifies the start of a new firmware download entry.
- `C` specifies the continuation of the above entry.

`hw_path` A logical hardware path, an asterisk (*), or a dash (-). "*" or "-" specifies all paths from the I/O tree for the device model in the `Modelx` field on the same line.

`fw_path` Full path of firmware file to be downloaded.

`Modelx` The device model, such as `u45000` for the U450 Async card.

`personality` Personality for the listed device model and hardware path specified in the `/etc/stratus/personality.conf` file. When the `personality` field is filled, `downloadd` reads the `/etc/stratus/personality.conf` file to obtain the hardware

paths. The hardware paths are identified when entry in the `Modelx` field and the entry in the `personality` field from the `download.conf` file match the entry in the `Modelx` field and the entry in the `personality` field from the `personality.conf` file.

`event` — A Fault Tolerant Service (FTS) event, such as initiating, enabling, disabling, activating, or deactivating the device. The event determines when the actions specified in the `command` field will be executed.

`INI` means start the daemon (of the specified protocol)

`ENA` means enable the device

`DIS` means disable the device

`ACT` means insert the device

`DEA` means remove the device

`command` — Command to be executed for the event specified in `event` field.

If the `personality` field in the `/etc/stratus/download.conf` file contains an asterisk (*), `downloadd` also reads the `/etc/stratus/personality.conf file`. Figure 2-2 is a sample `/etc/stratus/personality.conf` file.

```
/etc/stratus/personality.conf
-----------------------------
#
# This file is used by downloadd deamon. If personality is set
# for any modelx in download.conf file and its hardware path
# is not specified ( *), then the deamon uses this file to get
# exact hardware path and firmware file name. Modelx and personality
# are matched from this file and download.conf file.
#
#  Modelx    Personality     Hw_path    Firmware_file_name
#  u40300    X25             0/2/3/0    /etc/x25/u400.dwn
#  u40400    DLC             0/3/5/0    /etc/opt/sna/u400.dwn
#  u40400    RSE             0/3/6/0    /etc/artic/rse_firmware.coff
#  k10200    X25             11/8/6     /etc/x25/ucomm_x25.pm
#  k11200    DLC             11/6/10    /etc/opt/sna/ucomm_dlc.pm
```

Figure 2-2. Sample personality.conf File

The fields in the `/etc/stratus/personality.conf` file have the same purpose and meaning as the fields in the `/etc/stratus/download.conf` file.

New cards with a `Modelx` entry configured in the `/etc/stratus/download.conf` can be added any time. Whenever a new card is added, `downloadd`:

- identifies the new device
- determines if the model for the device is present in the `download.conf` file `Modelx` field
- downloads the firmware as specified in the `command` field when `INI` is in the `event` field for the model in the `download.conf` file

To add a new device when the model of the device is not listed in the `Modelx` field:

1. Add an entry for the new model in the `download.conf` file (be sure to include the new specification for the `Modelx` field).
2. Issue the following command to reread the configuration file:

   `downloadd -rescan`

   Whenever a new type of card is added and a new entry is added in the `Modelx` field, this command line initiates the `downloadd` daemon. `downloadd` identifies the new cards and downloads firmware as specified in the `command` field when `INI` is in the `event` field for the model in the `download.conf` file. The `downloadd` command options include:

   `-kill` Kill the running `downloadd` daemon.

   `-rescan` Reread the `/etc/stratus/download.conf` configuration file

   `-h` Help messages

If you want to burn different firmware to a board in a particular slot, you need to configure `download.conf` and `personality.conf`.

For example, to burn new firmware to the K118 device in a specific slot, you must add entries to `download.conf` and `personality.conf`.

In `download.conf`, add the following entries for the K118 device:

```
F * - k11800 ALD INI "kdload -d /dev/diag/mux$INST -f $FW_PATH"
C * - k11800 -   ENA "kdload -d /dev/diag/mux$INST -f $FW_PATH"
C * - k11800 -   ACT "kdload -d /dev/diag/mux$INST -f $FW_PATH"
```

In `personality.conf`, add the following entries for the particular firmware and slot desired for the K118 device:

```
k11800 ALD 11/10/12 /etc/stratus/prom_code/ioa18_async.pm
k11800 ALD 11/10/16 /etc/stratus/prom_code/ioa18_async.pm
```

In this case, `11/10/12` is the desired slot for the K118 device, and `/etc/stratus/prom_code/ioa18_async.pm` is the firmware file name you want to burn on this device.

Configuring a Peripheral (A Summary)

First, prepare for configuring the peripheral by gathering information required for the successful configuration of the peripheral. The considerations vary depending on the peripheral type and are discussed in each peripheral-specific chapter. For example:

- Have you prepared the location for the peripheral device?
- To what interface are you connecting the peripheral?
- What device drivers are required by the peripheral device?

The System Administration Manager (SAM) and the `addhardware` command provide a simple interface for configuring the HP-UX operating system for standard peripheral devices.

On Continuum systems, the kernel is automatically loaded back into the LIF when the `mk_kernel` command is invoked or the system is rebooted. The `addhardware` command automatically runs the system utilities needed to remake the kernel and bring the new device online. This operation can be performed on a running system. There is no need to reboot the Continuum system to add new replacement hardware. SAM will also automatically reburn the flash card on Continuum Series 400 systems.

Here is how to update the Continuum system for most standard devices, or most additional and replacement devices of a previously configured type:

1. Configure system components for the new peripheral according to your hardware documentation.
2. Power on the peripheral device(s).
3. Run the `addhardware` command. The HP-UX operating system will scan for the new hardware and make the necessary updates to the HP-UX operating system file. The device special files required by the new peripheral device will be created in the appropriate `/dev` directories.
4. Verify the configuration by invoking the `ioscan` command (see the *ioscan*(1M) man page for more information).

3

Configuring Serial Ports for Terminals and Modems

This chapter contains the procedures for configuring serial ports and related terminals and modems on a Continuum system. For the HP-UX operating system to communicate with a terminal or modem, the following conditions must be met:

- The serial device driver that is required to communicate with the device must be configured into the kernel.
- The terminal or modem must be attached and configured to the port.
- A device special file must be created to communicate through the port.
- A `getty` process must be run against the (terminal) port to solicit logins.

Configuring Console Controller Serial Ports

Stratus provides a default configuration for the ports supported by the console controller. (See the "Getting Started" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for a description of console controller features.) However, you might need to change the configuration at some point. This section describes how to properly configure the console port(s) and terminal to communicate with your system.

See Chapter 7, "Configuring Asynchronous Serial Interfaces," for information about configuring asynchronous serial ports off other cards. See the "Remote Service Network" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about configuring the Remote Service Network (RSN).

The console controllers support three serial ports, a console port, a port reserved for the RSN modem, and an auxiliary port that you can use for various purposes (for example, an external UPS). The ports are located on the back of the system base or cabinet in a Continuum system. The port assignments are as follows:

Port 0 Console

Port 1 Remote Service Network (RSN)

Port 2 Auxiliary port (for UPS or secondary console)

By default, the ports are configured as shown in Table 3-1.

Table 3-1. Console, RSN, and Auxiliary Port Configuration

Console Port	RSN Port	Auxiliary Port	Auxiliary Port for UPS
9600 baud	9600 baud	9600 baud	2400 baud
7 bits	7 bits	7 bits	8 bits
odd parity	odd parity	odd parity	no parity
1 stop bit	1 stop bit	1 stop bit	1 stop bit

Normally, you do not need to change these settings. However, you can change a port configuration by burning a new `config` partition in the console controller.

To burn a new `config` partition, do the following:

1. Check your console terminal manual, and any other devices that you need to connect to one of the serial ports, to determine the correct line settings.
2. Determine which console controller is on standby. To do this, enter

   ```
   ftsmaint ls 1/0
   ftsmaint ls 1/1
   ```

   Look for `Online Standby` in the `Status` column; this state identifies the standby console controller (the online controller lists an `Online` state). Note the location, either `1/0` or `1/1` in the `H/W Path` column.

NOTE

You must specify the standby board for any console controller board-burning commands. You will get an error if you specify the online board.

3. Burn the port configuration information into the standby console controller. To burn the `config` partition, enter

   `ftsmaint burnprom -F config` *`hw_path`*

   `hw_path` is the hardware path of the standby console controller (as determined in step 2), which is either `1/0` or `1/1`. For example, if the standby console controller is located at `1/0`, enter

   `ftsmaint burnprom -F config 1/0`

4. The system displays a set of prompts that let you configure the console, secondary console, and RSN ports. The default values are shown in brackets. Enter the appropriate port configuration changes (if any) for all three ports, as in the following display. If you are modifying a field and are not sure what values are valid, type `help` (or `h` or `?`) for help. The system displays the valid values and prompts you to continue.

```
Enter your modified values
<CR> will keep the same value
Type ‘quit’ to quit and UPDATE the partition
Type ‘abort’ to abort and DO NOT UPDATE the partition

For the Console port

Bits per character [7]:
Baud rate [9600]:
Stop bits [1]:
Parity [odd]:

For the Secondary Console/UPS port

Bits per character [7]:
Baud rate [9600]:
Stop bits [1]:
Parity [odd]:

For the RSN port

Bits per character [7]:
Baud rate [9600]:
Stop bits [1]:
Parity [odd]:
```

5. The system next displays the following three prompts:

```
power up on boot [1]:
allow host config [0]:
shadow console setup [0]:
```

   To change a default value, enter the new value at the appropriate prompt. These prompts serve the following purposes:

   – The `power up on boot` prompt allows you to set whether the system automatically powers up when power is restored to the system after being shut down. By default (`1`) the system powers up automatically when booting; that is, the console controller turns on power to all of the other boards in the system. Alternatively, if you enter `0` at this prompt, the system will not power up at boot, but will immediately enter the console command menu and wait for the administrator to enter a command. The `power up on boot` prompt applies to Continuum Series 600 and 1200 systems only; it has no effect on Continuum Series 400 systems.

   – The `allow host config` prompt sets whether the host can override the configuration settings for the console port. (This setting applies to the secondary port if the `shadow console setup` value is set to 1 or 2.) By default (`0`), only the port configuration values read from the `config` partition are used; requests from the host to change the port configuration are ignored. To allow the host to specify a different port configuration, enter `1` at this prompt.

   – The `shadow console setup` prompt sets the function of the auxiliary port. You can enter one of the following values:

     `0` Do not enable the secondary console port (the default).

     `1` Enable the secondary console port as a shadow to the main console, and report all input and output from the main console.

     `2` Enable the secondary console port as a shadow to the main console port, but report output only from the main console (discard input).

     `3` Enable the secondary console port as a fully independent channel.

     `4` Enable the secondary console port as a UPS connection port. (Connect the UPS directly to this port; no other configuration is necessary.)

NOTE

For information on installing a UPS, see your hardware installation documentation.

6. To activate the new settings, the standby console controller you just updated must become the online console controller. To switch the status of both controllers (online becomes standby and vice versa), enter

   `ftsmaint switch` *`hw_path`*

   `hw_path` is the hardware path of the standby console controller (as determined in step 2), which is either `1/0` or `1/1`. For example, if the standby console controller is located at `1/0`, enter

   `ftsmaint switch 1/0`

7. Check that the status of the newly updated console controller board is `Online` and that the other console controller board is `Online Standby`. To do this, enter

   `ftsmaint ls 1/1`
   `ftsmaint ls 1/0`

   The `Status` values should be the opposite of those observed in step 2.

8. Update the PROM code on the console controller that is now on standby by repeating steps 3–5 for this console controller. Once this is completed, both console controllers will be updated with the new configuration.

9. To return the boards to the state in which you found them, switch the status of the two console controllers again. To do this, enter

   `ftsmaint switch` *`hw_path`*

   `hw_path` is the hardware path of the new standby console controller (as set in step 6). For example, if the standby console controller is located at `1/1`, enter

   `ftsmaint switch 1/1`

10. To verify that the boards have returned to the appropriate state, and that the `Firmware Rev` has been updated with the revision number of the PROM files you just used to update them, repeat step 2.

Configuring the Console Terminal

The `addhardware` command detects any new terminals added to the system and automatically configures them into the system, without need for shutdown or reboot. Therefore, any qualified terminal with a valid entry in the system `terminfo` file can be configured into the system simply by running the `addhardware` command. For more information, see the *addhardware*(1) man page.

Use the following procedure to verify or change the console terminal configuration:

1. You can make sure that your terminal is properly configured by entering the Quick Setup screen. To do this, press the F1, Ctrl-F3, or Ctrl-Select keys. The Quick Setup screen will appear.
2. For V105 consoles, check these values against the values shown in the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H); for other terminals, check the manual supplied with that terminal.

   If you are using a V105, the console terminal should be set to VT320 emulation mode (which is the default setting). The setting for VT300-7 should be selected from the Quick Setup screen at installation.
3. Press the Pause key to exit the Quick Setup screen. The terminal prompts you to enter `Y` or `y` to save your changes.
4. To configure the `TERM` environment variable for your terminal type, include the following parameters in the root `/.profile` file:

   ```
   TERM=terminal_type
   export TERM
   tput init
   tabs
   ```

   The `TERM` environment variable establishes your terminal type. For example, enter `TERM=vt320` for a V105 terminal running in VT320 emulation mode. The `tput` command initializes your terminal, and the `tabs` command sets tabs. For detailed information concerning these commands, see the *tput*(1) and *tabs*(1) man pages.

If your console is not working properly, make sure that your settings are correct. The `terminfo` settings for your V105 terminal should already be set up for you. Consult your terminal documentation and the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation*

and Maintenance Guide (R024H) for more information on terminal setup and settings. If you lose communication with the system, also check the serial cable connections.

Configuring Other Terminals

As noted in the preceding section, "Configuring the Console Terminal," you can configure a new terminal into the system simply by running the `addhardware` command. Use the following procedure to add a new entry to the `terminfo` directory or to set up an individual's environment to use a specific terminal.

1. If this is not a Hewlett-Packard terminal, make sure the fileset[1] `NONHPTERM` is on the system by using either of these methods:

   – `swlist -l fileset NonHP-Terminfo`

     If the fileset exists, the entry for `NonHP-Terminfo.NONHPTERM` appears.

   – `ll /usr/adm/sw/products/NonHP-Terminfo`

     If the fileset exists, the directory `/usr/adm/sw/products/NonHP-Terminfo/NONHPTERM` exists.

   If the fileset is not on the system, you need to load it from your HP-UX operating system media. For more information, see the *swinstall*(1M) man page.

2. Look in the directory `/usr/share/lib/terminfo` for a file that corresponds to the terminal you want to set up.

   For example, suppose you want to set up a user with a Wyse™ 100 terminal. All supported terminals whose names begin with `w` are contained in the `/usr/share/lib/terminfo/w` directory. Because this directory contains a `wy100` entry, you have probably found the correct file. To be sure, examine the contents of the file. You will see a full screen of special characters, but near the beginning you will see `wy100|100|wyse 100`. This verifies the correct file and shows that you can refer to the Wyse 100 by any of the names `wy100`, `100`, or `wyse 100`.

   If you find a file for the terminal you have, skip to step 4.

   If you do not find a `terminfo` file for your type of terminal, you need to create one. Go to step 3.

1. A fileset is a collection of files that make up a particular product or option. A fileset is the software object upon which most SD-UX software management operations, like `swinstall`, are performed.

3. To create a new `terminfo` file, follow the directions in the *terminfo*(4) man page.

   To adapt an existing `terminfo` file, follow these steps:

   a. Log in as super-user.

   b. Make an ASCII copy of an existing `terminfo` file. For example, to copy the file `/usr/share/lib/terminfo/w/wy100`, enter

      `untic wy100 >` *`new_file`*

   c. Edit the new file to reflect the capabilities of the new terminal. Make sure you change the name(s) of the terminal in the first line.

   d. Compile the new `terminfo` file. To do this, enter

      `tic` *`new_file`*

      For more information, see the *tic*(1M) and *untic*(1M) man pages.

4. Set the user's `TERM` variable in the appropriate login script (either `.profile` for Korn and POSIX shell users or `.login` for C shell users). For example, to specify a Wyse 100 terminal, enter one of the following:

   `export TERM=wy100` *`(Korn or POSIX shell)`*
   `setenv TERM wy100` *`(C shell)`*

   The default versions of these scripts prompt the user for the terminal type when they log in. If you are unable to edit the script, tell the user to type the terminal name at the prompt. For example, to specify a Wyse 100 terminal, enter

   `TERM = (hp) wy100`

   You can also set the `TERM` variable with the `ttytype` command. For more information, see the *ttytype*(1) man page.

4

Configuring Disk Drives

This chapter gives procedures and guidelines for configuring disk drives using the SCSI interface. When configuring a disk drive, have available the following additional documentation:

- *HP-UX Operating System: Fault Tolerant System Administration* (R1004H)
- *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H)
- *Managing Systems and Workgroups* (B2355-90157)
- online man pages
- pertinent hardware documentation for the computer, device adapter, and peripheral device
- record of your disk configuration

See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about how disks are identified and addressed on Continuum systems. See the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) for information about installing a disk expansion cabinet.

Planning to Configure a Disk Drive

Review the material discussed in this chapter for each kind of disk drive. The correct device driver must be present in the kernel for the interface and disk device you are installing. Once you have planned your disk configuration, proceed to the "Managing Disk Devices" section.

Performance

Overall system performance depends partly on how your disks are arranged on your system.

To optimize performance, consider the distribution of data on your disks.

If possible, use several smaller disks instead of a single, larger-capacity disk for all disk needs. Configure a small sized disk (for example, 2 GB) to hold the `/` and `/usr` file systems and any software applications. Use separate disks for user files, database files, and any other storage that grows over time. This allows the system to perform more efficiently by distributing I/O across spindles and shortens the time for file system integrity check.

Mirror disks across buses to achieve maximum performance and fault tolerance.

Do not exceed Stratus-recommended guidelines for maximum number of disks per interface card. Note too that the kind of disk access (random vs. sequential), CPU overhead and total system capacity, cabling distance, disk-array configuration, and block size all affect performance.

Consult your Stratus sales representative for information on performance expectations, based on your predominant system I/O workload and disk characteristics.

NOTE

Hewlett-Packard systems support CD-ROM drives in a similar manner to disk drives. Continuum Series 400 systems support CD-ROM drives on the external SCSI bus only. Therefore, configuration considerations are different than those for Hewlett-Packard systems.

Managing Disk Devices

The procedures in this section apply to all cases of adding, replacing, moving, and deleting disk drives.

CAUTION

Although SAM allows you to manage disk devices, do not use SAM for any of the following procedures (add, replace, move, or delete a disk). Using SAM might cause the procedure to fail and leave the LVM in an inconsistent state.

NOTE

This chapter includes procedures for adding, replacing, moving, or deleting a disk. In general, the only tasks you need to perform are adding a new disk to an empty slot or replacing a malfunctioning disk in its current slot. Moving and deleting a disk are rare events. However, one such situation is when you replace a smaller with a larger disk. In that case you must first delete the smaller disk and then add the larger disk. The replacement procedure applies to disks of the same size (model number) only.

Adding a Disk Drive

Use the following procedure to add a new disk drive to your system:

1. Log in as `root`.
2. Install the hardware, following instructions provided in the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H).
3. Configure the device into the system by entering

   `addhardware`

   This command updates the `ioconfig` file, writes the new configuration back to the boot location, identifies the new disk to the HP-UX operating system, associates it with its device driver, and creates the character and block device special (`/dev`) files required to communicate with the disk. See the *addhardware*(1) man page for more information.

4. Verify that the new disk is configured into the system by entering the following commands:

   ioscan -fn -C disk
   ftsmaint ls *hw_path*

   hw_path is the hardware path to the disk. Confirm that the disk is present, CLAIMED, and Online, and that device special files have been created for it in the /dev/dsk and /dev/rdsk directories. (There is substantial overlap between the ftsmaint and ioscan commands, but the ftsmaint command does not include the device file names and the ioscan command does not include the Status information.)

NOTE

Physically adding a disk does not configure it into a logical volume. See the "Managing Disks Using the Logical Volume Manager (LVM)" chapter in the *Managing Systems and Workgroups* (B2355-90157) and the "Mirroring Data" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for information about configuring a new disk using the LVM.

Replacing a Broken Disk Drive

Use the following procedure to replace a broken disk drive:

1. Log in as root.
2. Determine the location and state of the disk you are replacing by entering

   ioscan -fn -C disk
   ftsmaint ls *hw_path*

   hw_path is the hardware path to the disk. Check the H/W Path, State, and Status columns. See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for a description of the possible states. (There is substantial overlap between the ftsmaint and ioscan commands, but the ftsmaint command does not include the device file names and the ioscan command does not include the Status information.)
3. Determine whether you replaced a mirrored or nonmirrored LVM disk.
   a. To determine the volume paths, enter

      vgdisplay -v

      Logical volume path names are in the LV Name fields. (The volume group path name is in the VG Name field.)

b. To determine the mirror state of the logical volumes, enter

lvdisplay *lv_name*

lv_name is the path name (identified in step a). Check the field `Mirror copies` for mirror information. Repeat for each logical volume.

4. Deallocate the logical volumes by entering

lvreduce [**-m 0**] *lv_path pv_path*

lv_path is the block device path name of the logical volume and *pv_path* is the path name of the physical volume (the disk to be replaced). Use the `-m 0` option if you replaced a mirrored disk; leave out this option if the disk was not mirrored. Repeat this command for each logical volume.

NOTE

Because the disk is broken, you might see some error messages after invoking `lvreduce`. You can ignore these error messages and proceed to the next step.

5. Remove the disk from its volume group by entering

vgreduce *vg_name pv_path*

vg_name is the path name of the volume group (obtained in step 3) and *pv_path* is the path name of the physical volume (the disk to be replaced).

6. Remove the disk drive and insert the new disk drive, following instructions provided in the hardware documentation. See the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) for instructions.

The green light on the disk will come on and its amber light will flash as the disk drive goes through self-test and is brought online. When the drive is online, the green light will go out.

7. Verify that the disk is operational by entering

ftsmaint ls *hw_path*

hw_path is the hardware path of the replaced drive. If the drive is not listed as `Online` and its `State` listed as `CLAIMED`, contact the CAC.

8. Create a physical volume on the new disk by entering

pvcreate [**-B**] *rpv_path*

rpv_path is the character (raw) device file name for the new disk, for example, `/dev/rdsk/c0t1d0`. Use the `-B` option if this is a boot disk.

9. Add the physical volume to the volume group by entering

   vgextend *vg_name pv_path*

   vg_name is the volume group name and *pv_path* is the block device file name, for example, `/dev/dsk/c0t1d0`.

10. Do one of the following:

    a. If you replaced a mirrored disk, reestablish the volume mirror by entering

       lvextend -m 1 *vg_name pv_path*

       Repeat for each logical volume.

    b. If you replaced a nonmirrored disk, restore the missing data from your backup archives (if available). See the *Managing Systems and Workgroups* (B2355-90157) for instructions on how to restore data.

11. Restore any volumes that were disabled by the failure. See the *Managing Systems and Workgroups* (B2355-90157) for more information.

Replacing an Online Disk Drive

Use the following procedure to replace an online disk drive:

1. Log in as `root`.
2. Determine the location and state of the disk you are replacing by entering the following commands:

   ioscan -fn -C disk
   ftsmaint ls *hw_path*

   hw_path is the hardware path to the disk. Check the `H/W Path`, `State`, and `Status` columns. See the "Administering Fault Tolerant Hardware" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) for a description of the possible states. (There is substantial overlap between the `ftsmaint` and `ioscan` commands, but the `ftsmaint` command does not include the device file names and the `ioscan` command does not include the `Status` information.)

3. Determine whether you are replacing a mirrored or nonmirrored LVM disk as follows:

   a. To determine the volume paths, enter

      vgdisplay -v

      Logical volume path names are in the `LV Name` fields. (The volume group path name is in the `VG Name` field.)

b. To determine the mirror state of the logical volumes, enter

lvdisplay *lv_name*

lv_name is the path name (identified in step a). Look in the `Mirror copies` field for mirror information. Repeat for each logical volume.

4. If you are replacing a nonmirrored LVM disk, move all the data contained on the disk to another disk by entering

pvmove *source_pv_path dest_pv_path*

source_pv_path is the path name of the physical volume (disk to be removed) and the *dest_pv_path* is the path name of the destination physical volume.

5. If you are replacing a mirrored LVM disk, do the following:

a. Remove mirroring for all logical volumes by entering

lvreduce -m 0 *lv_path pv_path*

lv_path is the block device path name of the logical volume and *pv_path* is the path name of the physical volume (the disk to be replaced). Repeat this command for each logical volume.

b. Remove the disk from its volume group by entering

vgreduce *vg_name pv_path*

vg_name is the path name of the volume group (obtained in step 3) and *pv_path* is the path name of the physical volume (the disk to be replaced).

6. Remove the disk drive and insert the new disk drive, following instructions provided in the hardware documentation. See the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) for instructions.

The green light on the disk will come on and its amber light will flash as the disk drive goes through self-test and is brought online. When the drive is online, the green light will go out.

7. Verify that the disk is operational by entering

ftsmaint ls *hw_path*

hw_path is the hardware path of the replaced drive. If the drive is not listed as `Online` and its `State` listed as `CLAIMED`, contact the CAC.

8. Create a physical volume on the new disk by entering

   pvcreate [**-B**] *rpv_path*

   rpv_path is the character (raw) device file name for the new disk, for example, `/dev/rdsk/c0t1d0`. Use the `-B` option if this is a boot disk.

9. If you replaced a nonmirrored disk drive, restore data to the new disk (assuming you saved the data in step 4), by entering

   pvmove *source_pv_path dest_pv_path*

   source_pv_path is the path name of the source physical volume (disk that has the source data) and the *dest_pv_path* is the path name of the destination physical volume (the new disk).

10. If you replaced a mirrored disk drive, perform the following steps to reestablish the mirroring:

    a. Add the physical volume to the volume group by entering

       vgextend *vg_name pv_path*

       vg_name is the volume group name and *pv_path* is the block device file name, for example, `/dev/dsk/c0t1d0`.

    b. Create the volume mirror by entering

       lvextend -m 1 *vg_name pv_path*

       Repeat for each logical volume.

Moving a Disk Drive

Use the following procedure to move a disk drive from one location to another in your system:

NOTE

Moving the root disk and moving an LVM root disk are special cases. You will find additional instructions at several points in this procedure to cover these requirements.

1. Log in as `root`.
2. Back up the files on the disk drive to be moved. See the "Backing Up and Restoring Data" chapter in the *Managing Systems and Workgroups* (B2355-90157) for instructions on how to back up data.

3. If you are moving a root LVM disk, determine the current root-disk configuration by entering

   `lvlnboot -v`

   This command displays the boot disk(s) device path name(s) and the logical volumes for boot, root, swap, and dump. Verify that the root disk is mirrored, and record the path name of the disk to be moved.

CAUTION

Do not move a root disk unless it is mirrored. Moving an unmirrored root disk will crash the system. If the root disk in question is not mirrored, mirror it before proceeding.

4. Display the contents of the active volume group(s) by entering

   `vgdisplay -v`

   Identify any logical volumes currently straddling the disk being moved and another disk.

5. If you find any straddled volumes in step 4, remove the logical volume(s).
   - If the volume is not mirrored, enter

     `lvremove` *`lv_path`*

     `lv_path` is the block device path name of the logical volume.
   - If the volume is mirrored, remove the mirroring by entering

     `lvreduce -m 0` *`lv_path`*

     Repeat for all straddled volumes.

6. Deactivate the volume group to which the disk is being added by entering

   `vgchange -a n` *`vg_name`*

   `vg_name` is the path name of the volume group.

7. Remove the disk from the current configuration.
   - If the disk comprises an entire volume group, enter

     `vgexport` *`vg_name`*
   - If the disk comprises a portion of a volume group, enter

     `vgreduce` *`vg_name pv_path`*

     `pv_path` is the block device path name of the physical volume. The disk is now free from associated volumes and can be used as desired.

8. Remove the disk drive from its current slot and insert it into its new slot, following instructions provided in the hardware documentation. See the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) for instructions.
9. Verify the relocated disk is properly configured into the system by entering the following commands:

   `ioscan -fn -C disk`
   `ftsmaint ls` *`hw_path`*

   `hw_path` is the hardware path to the disk. Confirm that the disk is present, `CLAIMED`, and `Online`, and that device special files have been created for it in the `/dev/dsk` and `/dev/rdsk` directories. (There is substantial overlap between the `ioscan` and `ftsmaint` commands, but the `ioscan` command does not include the `Status` information, and the `ftsmaint` command does not include the device file names.)
10. Create a physical volume on the disk.
    – If the disk is not a boot disk, enter

      `pvcreate` *`rpv_path`*

      `rpv_path` is the character (raw) device file name for the new disk.
    – If the disk is a boot disk, enter

      `pvcreate -B -f` *`rpv_path`*
11. Add the disk to the volume group.
    – If the disk comprises an entire volume group, enter

      `vgexport` *`vg_name pv_path`*
    – If the disk comprises a portion of a volume group, enter

      `vgextend` *`vg_name pv_path`*
12. If you unmirrored a logical volume (that is, used the `lvreduce` command) in step 5, re-establish the volume mirror by entering

    `lvextend -m 1` *`lv_path`*

    `lv_path` is the block device path name of the logical volume. Repeat for all volumes that were unmirrored in step 5.

13. If the newly located disk is not the root disk, you can mount it by entering

    `mount -a`

    If the newly located disk is the root disk, it has been mounted already by other means.

14. Update any software application configurations that use the relocated disk drive to make sure they use the new device files. See your software application documentation for specific instructions.

For more information on the use of mirroring and associating and dissociating disks with their volume groups, see the *Managing Systems and Workgroups* (B2355-90157) and the "Mirroring Data" chapter in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H).

Deleting a Disk Drive

Use the following procedure to permanently remove a disk drive from your system:

1. Log in as `root`.
2. Back up the files on the disk drive to be deleted. See the *Managing Systems and Workgroups* (B2355-90157) for instructions on how to back up data.
3. Display the contents of the active volume group(s), by entering

   `vgdisplay -v`

   Identify any logical volumes currently straddling the disk being moved and another disk. Logical volume path names are in the `LV Name` fields. (The volume group path name is in the `VG Name` field.)
4. Determine the mirror state of the logical volumes by entering

   `lvdisplay` *`lv_name`*

   `lv_name` is the path name (identified in step 3). Look in the `Mirror copies` field for mirror information. Repeat for each logical volume.
5. If you find any straddled volumes in step 3, remove the logical volume(s).
   - If the volume is not mirrored, enter

     `lvremove` *`lv_path`*

     `lv_path` is the block device path name of the logical volume.
   - If the volume is mirrored, remove the mirroring by entering

     `lvreduce -m 0` *`lv_path`*

     Repeat for all straddled volumes.

6. If you are removing a nonmirrored LVM disk and you want to save the data, move all the data contained on the disk to another disk by entering

   pvmove *source_pv_path dest_pv_path*

   source_pv_path is the path name of the physical volume (disk to be removed) and the *dest_pv_path* is the path name of the destination physical volume.

7. If you are removing a mirrored online LVM disk, remove the disk from its current configuration.

   – If the disk comprises an entire volume group, enter

     vgexport *vg_name*

     vg_name is the path name of the volume group.

   – If the disk comprises a portion of a volume group, enter

     vgreduce *vg_name pv_path*

     pv_path is the block device path name of the physical volume. The disk is now free from associated volumes and can be used as desired.

8. If you are removing the disk drive your kernel uses for primary swap and dump and the LVM disk is not mirrored, reconfigure the kernel to reassign them. For more information, see the *Managing Systems and Workgroups* (B2355-90157).

9. Remove the disk drive, following instructions provided in the hardware documentation. See the *HP-UX Operating System: Continuum Series 400 Operation and Maintenance Guide* (R001H), the *HP-UX Operating System: Continuum Series 400-CO Operation and Maintenance Guide* (R025H), or the *HP-UX Operating System: Continuum Series 600 and 1200 Operation and Maintenance Guide* (R024H) for instructions.

   If you check the status of the disk by entering `ftsmaint ls` *hw_path*, the display will show that the status of the disk is `NO_HW`. The disk node must be manually removed if the disk is permanently removed from the system.

10. Update any software application configurations that use the removed disk drive. See your software application documentation for specific instructions.

Determining Disk Drive Characteristics

To display information about a specific disk, enter

```
diskinfo char_device
```

char_device is the character special file for that disk, as in the following example:

```
# diskinfo /dev/rdsk/c1t0d0
SCSI describe of /dev/rdsk/c1t0d0:
vendor: SEAGATE
product id: ST32550W
type: direct access
size: 2097029 Kbytes
bytes per sector: 512
```

SCSI disks can be further identified by the product ID field. The number displayed does not correspond to the Stratus model number of the disk, but rather to an "inquiry response" derived from querying the disk firmware itself using a SCSI inquiry command. The inquiry response often resembles a product number or product number family.

See the *diskinfo*(1M) man page for more information.

If you have a disk hardware problem and are working with a Stratus service engineer, reporting the inquiry response provides useful information such as firmware revision, disk mechanism, form factor, and capacity.

After Configuring the Disk Drive

After configuring the HP-UX operating system for a disk device, you can complete the following tasks required to put it to use:

- setting up powerfail capabilities for the disk or disk array
- setting up or modifying RAID levels for a disk array, if necessary
- adding a disk to an LVM volume group
- mirroring the disk
- defining logical volumes in LVM
- making the disk available for swapping
- creating or moving file systems onto the disk
- exporting the disk using NFS capabilities
- controlling access to the information on the disk
- controlling disk usage by implementing disk quotas
- integrating the disk into your backup strategy
- restoring data to the disk from other disks
- moving file systems to more equitably use your disk space
- creating a recovery system for the data on the disk, particularly if this is the root disk

Once you have configured a disk and are creating a file system, the HP-UX operating system uses the correct disk geometry, without requiring you to cite an explicit `/etc/disktab` entry.

For information about these tasks, see the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H), the *Managing Systems and Workgroups* (B2355-90157), relevant hardware manuals, and the online man pages.

5

Configuring Tape Drives

Several kinds of tape drives, having different recording methods and formats, can be configured to the HP-UX operating system.

On a Continuum Series 400 system, options include:

- nine-track reel-to-reel tape drive
- 525 MB QIC cartridge tape
- 3480 IBM-compatible
- DDS (DAT) tape drive

On a Continuum Series 600 and 1200 system, options include:

- 18-track, 3480-media compatible
- DDS III, 4 mm, 72/144 GB DAT with autoloader, 6 cartridges
- DDS III, 4 mm, 12/24 GB DAT
- 1.2 GB QIC tape
- DDSDAT with autoloader

Despite their differences, any of these tape drives can be configured into the HP-UX operating system by the same basic procedure:

1. Add the tape device to the system and run the `addhardware` command.
2. Set the tape drive to a unique address on the SCSI interface bus.
3. Follow the steps documented in this chapter to configure the HP-UX operating system for the device.

When configuring a tape drive, have available the following additional documentation:

- *Continuum 600 and 1200 Series: Tape-Drive Operation Guide* (R442), *HP-UX Operating System: Continuum Series 400 Hardware Installation Guide* (R002H), *HP-UX Operating System: Continuum Series 400-CO Hardware Installation Guide* (R021H), or other appropriate installation guide
- *HP-UX Operating System: Fault Tolerant System Administration* (R1004H)
- the online man pages

Tape drives can be configured using either SAM or the command-line interface.

Configuring a Tape Drive

The simplest way to configure a tape drive is to use SAM. If SAM is not loaded on your system or if you prefer to use the command-line interface, the following procedure will guide you through the task. You should understand the instructions before getting started. Instructions on using SAM can be found in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H) and the *Managing Systems and Workgroups* (B2355-90157).

1. Log in as `root`.
2. Check what SCSI addresses are available (that is, what addresses have not yet been used) on the external SCSI port to which you are attaching the tape drive. To do this, enter

   `ftsmaint ls`

   Check for SCSI addresses used at LSM locations. The new tape drive can use any unused legal (0–5; 5 recommended) SCSI address. Figure 5-1 shows sample `ftsmaint` output.

```
Modelx H/W Path     Description          State   Serial#   PRev   Status   FCode  Fct
================================================================================
-      14           LSM Nexus            CLAIM   -         -      Online   -      0
-      14/0/0       LSM Adapter          CLAIM   -         -      Online   -      0
-      14/0/0.0                          CLAIM   -         -      Online   -      0
d80200 14/0/0.0.0   SEAGATE ST32550W     CLAIM   -         -      Online   -      0
-      14/0/0.1                          CLAIM   -         -      Online   -      0
d80330 14/0/0.1.0   SEAGATE ST34573WC    CLAIM   -         -      Online   -      0
```

Figure 5-1. Sample Continuum System ftsmaint output, LSM portion

3. Install the tape drive, following instructions provided in the hardware documentation. See the *HP-UX Operating System: Continuum Series 400 Hardware Installation Guide* (R002H) or the *HP-UX Operating System: Continuum Series 400-CO Hardware Installation Guide* (R021H) for instructions.
4. Turn on power to the tape drive.
5. Configure the device into the system. To do this, enter

   `addhardware`

   Executing this command does the following:

   – updates the `ioconfig` file:

   – writes the new configuration back to the boot location (flash card for Continuum Series 400 systems and boot disk for Continuum Series 600 and 1200 systems)

   – identifies the new tape drive to the HP-UX operating system

   – associates it with its device driver

   – creates the character and block device special (`/dev`) files required to communicate with the tape drive

   See the *addhardware*(1) man page for more information.
6. After waiting sufficient time for the drive to come online, verify that the tape drive is configured into the system. To do this, enter the following commands:

   `ioscan -fn -C tape`
   `ftsmaint ls` *`hw_path`*

   `hw_path` is the hardware path to the tape drive. Confirm that the tape drive is present, `CLAIMED`, and `Online`, and that device special files have been created for it in the `/dev/dsk` and `/dev/rdsk` directories. (There is substantial overlap between the `ftsmaint` and `ioscan` commands, but the `ftsmaint` command does not include the device file names and the `ioscan` command does not include the `Status` information.)

   In the following sample output, the tape driver at hardware path `14/0/3.4.0` can be accessed by one of eight device files.

```
# ioscan -fn -C tape
Class   I  H/W Path   Driver    S/W State    H/W Type   Description
===================================================================
tape    0  14/0/3.4.0 stape     CLAIMED      DEVICE     HP35480A
  /dev/rmt/0m     /dev/rmt/c0t3d0BESTn
  /dev/rmt/0mb    /dev/rmt/c0t3d0BEST
  /dev/rmt/0mn    /dev/rmt/c0t3d0BESTb
  /dev/rmt/0mnb   /dev/rmt/c0t3d0BESTnb
```

7. Verify that you can read and write to and from the device. One way to do this is through the `tar` command. In the following example, the first `tar` command writes the `/etc/passwd` file to tape using a device special file shown in the `ioscan` output from step 6. The second `tar` command displays the contents of the tape.

```
# tar cvf /dev/rmt/c0t3d0BEST /etc/passwd
a /etc/passwd 2 blocks

# tar tvf /dev/rmt/c0t3d0BEST
```

For information about tape drives operation and maintenance, see the *Continuum 400 Series: Tape-Drive Operation for the HP-UX Operating System* (R003H), the *HP-UX Operating System: Continuum Central-Office Series 400 Tape-Drive Operation* (R022H), or the *Continuum 600 and 1200 Series: Tape-Drive Operation Guide* (R442).

After Configuring a Tape Drive

Table 5-1 lists the man pages that describe commands and special files related to typical tape drive tasks and capabilities.

NOTE

By default, `insf` creates device special files that write tapes with data compression enabled if the tape drive doing the writing supports data compression. If you have to write a tape on a tape drive that supports data compression, but you need to read it on a tape drive that does not support data compression, you must create the tape using a device special file with data compression disabled, using `mksf`.

Table 5-1. Tape-Drive Commands and Special Files

Man Page	Description of Command
cpio(1)	Copy file archives in and out
dd(1)	Convert, reblock, translate, and copy a file
ftio(1)	Faster tape I/O
fjauto(1)	Magnetic tape manipulating program for the T403 autoloader
mediainit(1)	Initialize disk or cartridge tape media; partition DDS
mt(1)	Magnetic tape manipulating program

Table 5-1. Tape-Drive Commands and Special Files *(Continued)*

Man Page	Description of Command
nohup(1)	Run a command immune to hang-ups, logouts, and quits
pax(1)	Portable archive exchange
tar(1)	Tape file archiver
backup(1M)	Backup or archive file system
cstm(1M)	Command-line interface to the Support Tool Manager
dump(1M)	Incremental file-system dump, local or across network
fbackup(1M)	Selectively back up files
frecover(1M)	Selectively recover files
install(1M)	Install commands
ioscan(1M)	Scan I/O system
lssf(1M)	List a special file
mk_kernel(1M)	Build a bootable kernel (Note: this command is the Stratus implementation of the HP-UX operating system `mk_kernel` command.)
mksf(1M)	Make a special file
mtar(1M)	Tape file archiver for T403
restore(1M)	Restore file system incrementally, local or across network
rmt(1M)	Remote magnetic-tape protocol module
savecore(1M)	Save a core dump of the HP-UX operating system
scsictl(1M)	Control a SCSI device
swinstall(1M)	Install the HP-UX operating system software
tar(4)	Special file containing information about the format of `tar` tape archive
mt(7)	Special file containing information about the magnetic tape interface and controls
mtx(7)	Special file containing information about the magnetic tape manipulating program for autoloading DAT tape
scsi(7)	Special file containing information about the Small Computer System Interface (SCSI) device drivers

Table 5-1. Tape-Drive Commands and Special Files *(Continued)*

Man Page	Description of Command
scsi_ctl(7)	Special file containing information about the SCSI device control device driver
scsi_tape(7)	Special file containing information about the SCSI sequential access (`stape`) device driver
ftsmaint(1M)	The Stratus hardware administration command, which can be used for viewing (similar to `ioscan`) and configuring hardware
addhardware(1)	This Stratus hardware administration command automatically associates a device with its required driver and updates the flash card accordingly

Table 5-2 lists the HP-UX operating system tape utilities that are not valid on Continuum systems.

Table 5-2. Unsupported Commands

Man Page	Description of Command
tcio(1)	Command set/80 (CS/80) cartridge tape utility
mkrs(1M)	Construct a recovery system
ct(7)	Special file containing information defining how *tcio*(1) accesses tape

6

Configuring CD-ROM Drives

NOTE

Continuum Series 400 systems support CD-ROM drives in a slightly different manner than Hewlett-Packard systems, due to support on the external SCSI bus only. However, Continuum Series 600 and 1200 systems support CD-ROM drives in the same manner as Hewlett-Packard systems. If you are aware of the Hewlett-Packard system model for CD-ROM support, you should be aware of these differences before replacing or installing a new CD-ROM drive. You cannot use the internal SCSI bus to support CD-ROM drives on a Continuum system.

Continuum Series 400 systems support both 4X and 15X types of CD-ROM drives. Continuum Series 600 and 1200 systems support only 15X types of CD-ROM drives. Despite their differences, any of these drives can be configured into the HP-UX operating system by the same basic procedure:

1. Set the CD-ROM drive to a unique address on the SCSI interface bus.
2. Add the device to the system and run the `addhardware` command.
3. Follow the steps documented in this chapter to configure the HP-UX operating system for the device.

When configuring a CD-ROM drive, refer to the appropriate hardware installation guides for your system, the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H), and the online man pages, as needed.

NOTE

You can configure CD-ROM drives either though SAM or the command-line interface.

Because CD-ROM disks hold only read-only file systems, you cannot create new file systems on CD-ROM or use them for swap space. Continuum Series 400 systems boot off a flash card. This means they cannot use CD-ROM drives as boot devices. However, Continuum Series 600 and 1200 systems can use CD-ROM drives as boot devices. See the *HP-UX Operating System: Installation and Update* (R1002H).

Configuring a CD-ROM Drive

The simplest way to configure a CD-ROM drive is to use SAM (see "Using SAM to Configure Peripherals" in Chapter 1, "Getting Started"). If you prefer to use the command-line interface, the following procedure will guide you through the task. Understand the instructions before getting started. Instructions on using SAM can be found in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H).

1. Log in as `root`.
2. Check for available SCSI addresses (that is, unused addresses).
   a. For Continuum Series 400 systems, check what SCSI addresses are available on the external SCSI port to which you are attaching the CD-ROM drive by entering

      `ftsmaint ls`

      Check for SCSI addresses used at LSM locations. The new CD-ROM can use any other legal (0–5; 3 recommended) SCSI address. Figure 6-1 shows a sample `ftsmaint` output.

```
Modelx H/W Path     Description          State    Serial#  PRev  Status FCode Fct
================================================================================
-      14           LSM Nexus            CLAIM    -        -     Online      -0
-      14/0/2       LSM Adapter          CLAIM    -        -     Online      -0
-      14/0/2.4                          CLAIM    -        -     Online      -0
d85500 14/0/2.4.0   SONY CD-ROM CDU-7     CLAIM    -        -     Online      -0
```

Figure 6-1. Sample Continuum System ftsmaint output, LSM portion

b. For Continuum Series 600 and 1200 systems, check the location of the CD-ROM drive by entering

`ftsmaint ls`

Check for addresses that are already used. The new CD-ROM can use any other legal address.

3. Install the CD-ROM hardware, following instructions provided in the hardware documentation.
4. For Continuum Series 400 systems *only*, turn on power to the CD-ROM drive.
5. Configure the device into the system by entering

`addhardware`

Executing this command:

- updates the `ioconfig` file
- identifies the new CD-ROM drive to the operating system
- associates it with its device driver
- creates the character and block device special (`/dev`) files required to communicate with the CD-ROM drive.

See the *addhardware*(1) man page for more information.

6. Verify that the CD-ROM is configured into the system by entering the following commands:

`ioscan -fn -C disk`
`ftsmaint ls` *`hw_path`*

`hw_path` is the hardware path to the CD-ROM. Confirm that the CD-ROM is present, `CLAIMED`, and `Online`, and that device special files have been created for it in the `/dev/dsk` and `/dev/rdsk` directories. (There is substantial overlap between the `ftsmaint` and `ioscan` commands, but the `ftsmaint` command does not include the device file names and the `ioscan` command does not include the `Status` information.)

7. To use the CD-ROM drive, insert a CD-ROM and mount the media by entering

`mount` *`device_file`* **`/SD_CDROM`**

`device_file` is the device file name for the CD-ROM drive.

7

Configuring Asynchronous Serial Interfaces

This chapter contains information on how to configure the asynchronous serial interface on Continuum systems.

HP-UX operating system multiplexers provide asynchronous data communication through RS-232C protocols. These RS-232C serial ports can support additional terminals, modems, or related devices.

Hardware Support

The asynchronous serial cards (U450 for Continuum Series 400 systems and K118 for Continuum Series 600 and 1200 systems) are of the class `tty` and will be shown as such in `ioscan` output. Figure 7-1 shows how the interface card and related devices would appear in a listing specifying the devices of class `tty`. The sample `ioscan` output was generated on a Continuum Series 400 system. On Continuum Series 600 and 1200 systems, the `asyn` driver is represented by an `ald` driver.

```
# ioscan -fk -C tty
Class     I  H/W Path  Driver   S/W State   H/W Type     Description
============================================================================
tty       0  0/2/2/0   asyn     CLAIMED     INTERFACE    Asyn Card
tty       1  0/3/3/0   asyn     CLAIMED     INTERFACE    Asyn Card
tty       2  15/2/0    artl0    CLAIMED     INTERFACE    console
tty       3  15/2/1    artl0    CLAIMED     INTERFACE    tty1
tty       4  15/2/2    artl0    CLAIMED     INTERFACE    tty2
```

Figure 7-1. ioscan -fk -C tty Command Output

Notice that the instance number (column `I`) for the asynchronous serial interface card in the example is 1. The other instance numbers are for the three console controller ports.

Instance numbers are assigned according to standard HP-UX operating system protocols. If no instance for the card is found on the flash card during booting, one will be assigned. If more than one asynchronous serial interface card is installed, each will have its own instance number in class `tty`.

Loading the Asynchronous Card Firmware

The U450 and K118 cards are intelligent cards; that is, they contain firmware that enables them to function. This firmware must be loaded onto the card when it is installed for the first time, or when the system is rebooted. The needed files are contained in the `/usr/sbin` directory. The files must also be reloaded if the system door is opened and shut, or the `ftsmaint` disable and enable commands are performed on it.

The `downloadd` daemon is automatically started at boot time. If this process is killed or needs to be restarted for some other reason, use the `downloadd` command to restart it. See the *downloadd*(7) man page for more information.

Under normal circumstances, the `downloadd` daemon will check the `/etc/stratus/download.conf` file, and download the appropriate firmware file automatically. Device access will fail if the asynchronous interface firmware is not downloaded.

The `downloadd` daemon keeps log files in the `/var/adm` directory, in the file `/var/adm/download.log`. This log should be consulted if problems occur.

Downloading the firmware to the interface card takes approximately 20 to 30 seconds.

Creating Device Special Files

Device special files for the asynchronous serial ports must be present in the `/dev` directory in order to use the card ports. These files must be created using the `mksf` utility.

NOTE

Appropriate device special files are created automatically when you configure a modem or terminal through the SAM interface. This section

briefly describes how to create device special files from the command line.

Determine the instance number of the interface card you are configuring. To check instance numbers, enter

```
ioscan -f
```

Instance numbers are in the `I` column. Port numbers 0–7 are assigned to the individual interfaces on each async card.

NOTE

Port numbers are numbered 0–7, but the numbers printed on the arms of the octopus cable are 1–8. Subtract one from the cable number to obtain the port number.

The device special files for the individual ports are created by using the `mksf` utility. The minor number of the file denotes whether the port is connected to a dial-in device, a dial-out device, or a direct connection.

For example, you can create a dial-in device special file for port 3 on card instance `1`.

- The following is a Continuum Series 400 sample command:

```
# mksf -d asyn -I 1 -p 3 -a2 -v
making ttyd1p3 c 130 0x010302
```

- The following is a Continuum Series 600 and 1200 sample command:

```
# mksf -d ald -I 1 -p 3 -a2 -v
making ttyd1p3 c 234 0x010302
```

You can use the `lssf` command to decode the minor number used to identify the device special file.

- The following is a Continuum Series 400 sample command:

```
# lssf /dev/ttyd1p3
asyn card instance 1 port 3 callin HW flow control at
address 3/3/0 /dev/ttyd1p3
```

- The following is a Continuum Series 600 and 1200 sample command:

```
# lssf /dev/ttyd1p3
ald card instance 1 port 3 callin HW flow control at
address 3/3/0 /dev/ttyd1p3
```

Each port can have one or more device special files associated with it. For more information, including port naming conventions, see the *mksf*(1M) and *insf*(1M) man pages.

Attaching Devices to the Asynchronous Serial Interface

The following sections describe issues and procedures related to attaching devices (modems or terminals) to an asynchronous serial interface.

Cable Connection and Flow Control

Cable connection and flow control require some understanding of the concepts behind them.

DTE and DCE Controllers

An asynchronous port behaves like data terminal equipment (DTE). The connected device must behave like data communications equipment (DCE).

Historically, a DCE was a classification for modems and DTE was some other device that terminated the data path, such as a terminal or the computer system itself. The data flow from one device to another would have been from the system (DTE) to a modem/phone line (DCE) to a remote device such as a terminal (DTE).

In asynchronous, full-duplex communications, the most common method of flow control between hardware components is by use of the Electronic Industries Association's EIA-232-D Request to Send (RTS) and Clear to Send (CTS) circuits. Both hardware and software flow control (Ctrl-S and Ctrl-Q, respectively) can be used simultaneously.

Hardware flow control is implemented by RTS and CTS lines. Asynchronous ports allow bidirectional hardware flow control. This bidirectional flow control means that either the DCE or DTE can indicate to stop transmitting data across the interface.

For more information, see the *termiox*(7) man page.

Null Modem Cabling

The asynchronous serial port is assumed to be configured as a DTE. If the connected device is also a DTE, DTE-to-DTE hardware flow control is only possible by using a null modem to interconnect the appropriate data and control circuits. Connecting a terminal to the system is an example.

To connect a terminal to the asynchronous port, you must use a null modem cable. If you are connecting a modem (DCE device), connect it directly to an arm of the octopus cable.

Null modem cable pins must be correctly configured. If the pins are not correctly configured, `getty` operations will not work. The correct pin positions are shown in Figure 7-2.

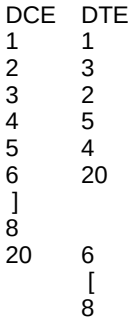

Figure 7-2. Null Modem Cable Pin-Outs

Configuring in the Device

You might need to add a `getty` entry to the `/etc/inittab` file for each new device if a login is needed. The easiest way to perform this configuration is by using the SAM interface. SAM creates the appropriate device files when adding an asynchronous serial device and will let you know if you are missing drivers if it cannot find a particular interface.

If you are not using SAM, you will need to create the device special files using `mknod`. For more information, see the *mknod*(1M) or *mksf*(1M) man pages.

The baud rates supported are:

- 50 baud
- 75 baud
- 110 baud
- 134 baud
- 150 baud
- 200 baud (not available for Continuum Series 600 and 1200 systems)
- 300 baud
- 600 baud
- 1200 baud
- 2400 baud

- 4800 baud
- 9600 baud
- 19200 baud
- 38400 baud (not available for Continuum Series 600 and 1200 systems)

The stop bits supported are 1.5 bits and 2 bits. Supported data bits are 5 bits, 6 bits, 7 bits, and 8 bits. Parity options of even, odd, and no parity are available. Hardware and software flow control is recommended for baud rates above 19200 baud.

Configuring an Asynchronous Terminal

Additional serial terminals might require setting configuration modes. The following procedure describes how to configure an asynchronous terminal.

1. Add a `getty` entry for each new terminal (which does not have an existing entry) to the `/etc/inittab` file. You can do this either with SAM or manually. Entries must conform to the pattern *`id`*`:`*`run_state`*`:`*`action`*`:`*`process`*, as documented on the *inittab*(4) man page. The following are two sample entries:

   ```
   ttp3:2:respawn:/usr/sbin/getty -h -t 60 tty0p3 {{9600}}
   ```

   `2` specifies a run state of 2 (multiuser), `respawn` specifies that `init` should restart the process if it is exited, and `/usr/sbin/getty` specifies the process that sets up serial terminal and modem ports and provides the initial login prompt.

   The `-h` option ensures that the `getty` will not hang up the line before setting the port speed, the `-t 60` option is a security option that requires the user login name and password to be typed within 60 seconds, and the `tty0p3` identifies the port in `/dev` to which the `getty` processes attach.

   The `{{9600}}` does *not* represent the baud rate. It is a pointer into the `/etc/gettydefs` file, telling the system side what entry to use. See the *gettydefs*(4) man page.

   ```
   tty1:2:respawn:/usr/sbin/getty -h tty0p3 H
   ```

   In this case, `tty0p3` identifies the port, and `H` specifies the `gettydefs` entry for port setup. `H` sets up the port for 9600 baud, eight data bits, no parity, and one stop bit, the standard setup for most terminals.

2. Instruct the system to use the new (latest) `/etc/inittab` settings by entering

   `init q`

3. Add an (optional) entry to `/etc/ttytype`. Entries should conform to the format documented on the *ttytype*(4) man page. The following are two sample entries:

   ```
   2392 console
   2392 tty0p3
   ```

   `2392` is the terminal type, while `console` and `tty0p3` are the device file names in the `/dev` directory.

4. The HP-UX operating system will now communicate with the new terminal. Verify that the communication parameters for the terminal correspond to their `/etc/gettydefs` entries. With the configuration complete, your terminal should display a `login` prompt.

Modem Interface Configuration

To add a modem, you need to configure the HP-UX operating system to recognize both the serial port and the modem protocol. Read the following procedure and the modem documentation before starting configuration.

NOTE

This procedure does not refer to the RSN modem, which is set up according to the procedures documented in the *HP-UX Operating System: Fault Tolerant System Administration* (R1004H).

Use the following procedure to configure a modem through the SAM interface:

1. Invoke the SAM interface by entering

   `sam`

2. From the initial screen, move through the following menus: Peripheral Devices -> Stratus Devices -> ASYNC SERIAL INTERFACE -> ADD TERMINAL/MODEM. (SAM includes online help if you need assistance.)

3. You are presented with a series of prompts. Enter the appropriate information as requested.

To set up the modem through the SAM interface, determine the following:

- the hardware path (including the instance number and port number) of the asynchronous serial interface to be used by the modem (by entering the `ioscan -C tty` command)
- the modem's baud rate
- whether the modem will be used for outgoing calls
- whether the modem will receive incoming calls
- whether the modem requires CCITT (required *only* by certain European government protocols). For standard Hayes™-compatible modems that use CCITT modulation and compression standards, do *not* use CCITT mode. See the *modem*(7) man page for details of RS-232C signaling for simple and CCITT modems.
- whether you need to configure for UUCP connectivity

If you do not use the SAM interface to configure your modem, use the `mksf` command to create device special files specifically for modem use. The `mksf` utility provides options for CCITT for special European protocol requirements (most U.S. customers should *not* use the CCITT option). Use the `-i` option for a UUCP dialer (used with access mode 0) and for hardware flow control (an alternative to XON/XOFF pacing).

Use your modem hardware documentation as your primary resource for setting switch positions and commands for proper functioning of your modem. However, the following modem information is specific to the HP-UX operating system:

- The modem should use auto-answer when DTR is raised, and hang up the line, disable auto-answer, and return to command state when DTR is dropped. The modem should perform power-on reset when DTR is dropped, as some modems temporarily raise CD during reset. (On Hayes modems, do *not* use `AT&D3`.)
- The modem should assert carrier detect only when there is a carrier. It should drop CD when carrier is lost. (This is the `AT&C1` setting on the Hayes modem.)
- The modem should pass through BREAK. The Break key is used for the interrupt signal as well as for baud-rate switching.
- Modem speed between the modem and the terminal should be known. However, speed can be adjusted in modem-to-modem connections by using the modem's autobaud speed detection. Initially, features such as hardware flow control (CTS/RTS) and error correction should be turned off. Once you have established that the modem communicates correctly, add these features one at a time.

- If modems connect to each other, but no data appears, turn off all compression, reliability, MNP, PEP, LAP, and other advanced features. Set the modem as simply as possible. Once working, add the advanced features.
- Do *not* use CCITT control signals on either modem or system. This does not affect the modem use of CCITT modulation or compression standards such as V.22, V.32, V.22bis, V.32bis, V34, V.42, or V.42bis.
- Save modem settings in nonvolatile modem memory so modem retains the setup after power loss. (Use `AT&W` on Hayes modems.)
- Record modem settings on a worksheet for future reference.

See the *mksf*(1M), *modem*(7), and *termio*(7) man pages for bit values and use.

Additional References

In addition to the material furnished in the manual, you can consult the following references:

- PCI card installation and operation documentation
- *HP-UX Operating System: Fault Tolerant System Administration* (R1004H)
- the *mksf*(1M), *insf*(1M), *stty*(1M), *modem*(7), and *termiox*(7) man pages
- *DTC Device File Access Utilities and Telnet Port Identification* (B1030-90002)

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